HUTTER FREI POWER GMBH

References

Combined Cycle Gas Turbine CHP Stations SYSTEM HUTTER

and

Thermal Combined Heat and Power Stations

References of delivered SYSTEM HUTTER and further CHP Stations

- **Combined Cycle CHP Station SYSTEM HUTTER Varel 1**
  for Paper- and Board Mill VAREL; Varel, Germany
- **Combined Cycle CHP Station Repowering to SYSTEM HUTTER Buchmann 1**
  for Board Mill BUCHMANN; Annweiler-Sarnstall, Germany
- **Combined Cycle CHP Station SYSTEM HUTTER Smurfit Kappa BKPO 1**
  for Board Mill SMURFIT KAPPA BADISCHE KARTON & PAPPEN; Obertsrot, Germany
- **Combined Cycle CHP Station SYSTEM HUTTER Smurfit Kappa Europa Carton Hoya 1**
  for Paper Mill SMURFIT KAPPA EUROPA CARTON; Hoya, Germany
- **Combined Cycle CHP Station SYSTEM HUTTER Varel 2**
  for Paper- and Board Mill VAREL; Varel, Germany
- **Combined Cycle CHP Station SYSTEM HUTTER Varel 3**
  for Paper- and Board Mill VAREL; Varel, Germany
- **Combined Cycle CHP Station SYSTEM HUTTER Buchmann 2**
  for Board Mill BUCHMANN; Annweiler-Sarnstall, Germany
- **Extension of Heating Plant with Steam Turbine Plant - Refurbishment and Modernisation of a used Steam Turbine**
  Paper Mill STORA ENSO UETERSEN, Uetersen, Germany
- **Waste Incineration Plant Mainz Line 3** – Overall Concept, Integration, Engineering and Delivery of Energy part around Steam Turbine
  KRAFTWERKE MAINZ-WIESBADEN – Entsorgungsgesellschaft Mainz mbH, Mainz, Germany
- **Combined Cycle CHP Station SYSTEM HUTTER UPM Nordland Papier 1** (Design, Pre-Engineering, Authority Permitting)
  UPM NORDLAND PAPIER; Dörpen, Germany

Operation Experience of Combined Cycle CHP Stations SYSTEM HUTTER

7 CHP Stations SYSTEM HUTTER in Operation

Cumulative Operating Experience:

- 155 Years
- 1’370’000 Operating Hours

Longest Operating Experience:

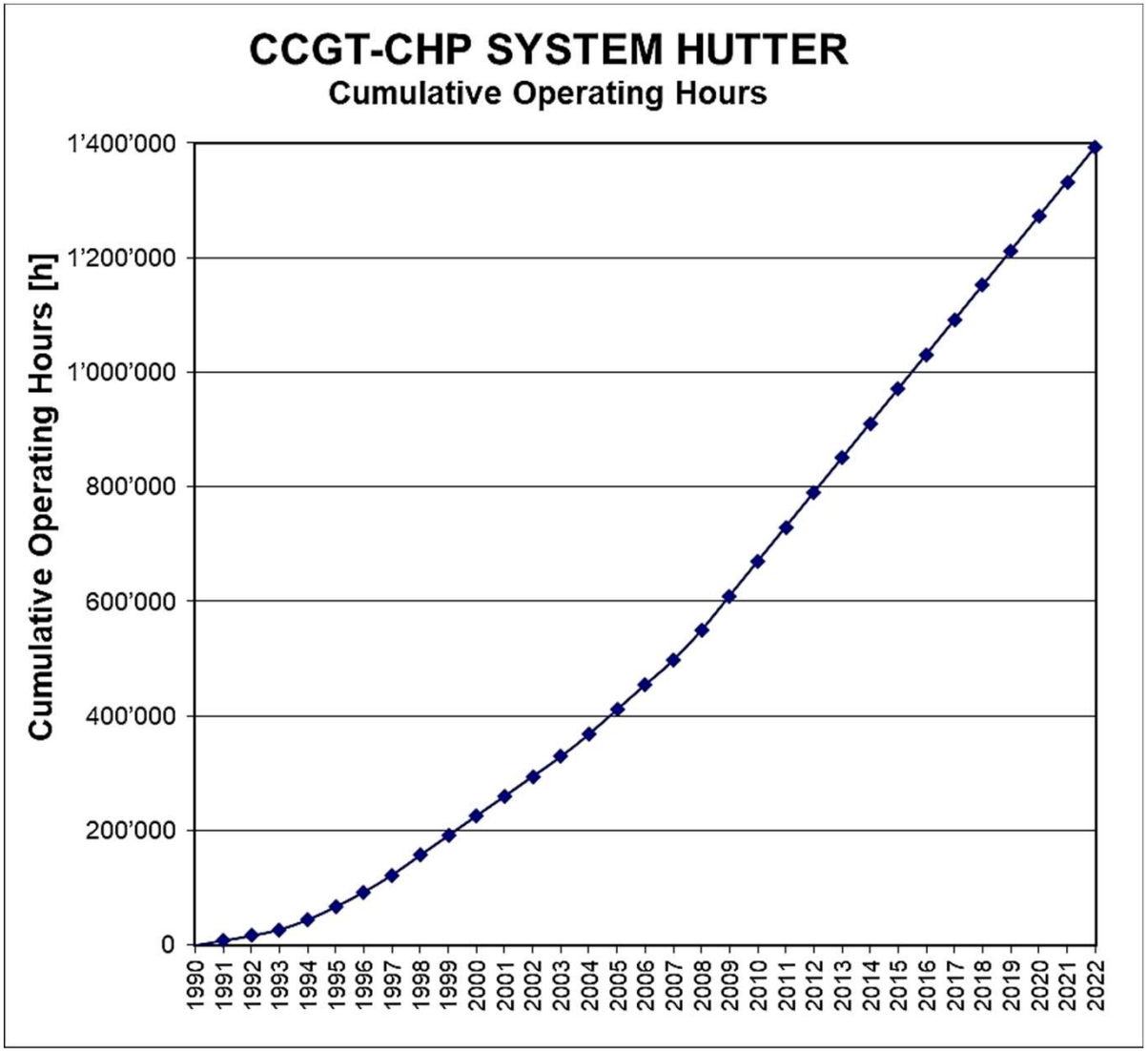
- 31 Years
- 270’000 Operating Hours

Time-Reliability:

- > 99.5 % for entire Power Station
- ø 99.98 % for Steam Generator Plant

Plant Reference sizes per block:

- from 7.2 $MW_{el.}$ / 32 t/h live steam
- to 25.6 $MW_{el.}$ / 95 t/h live steam

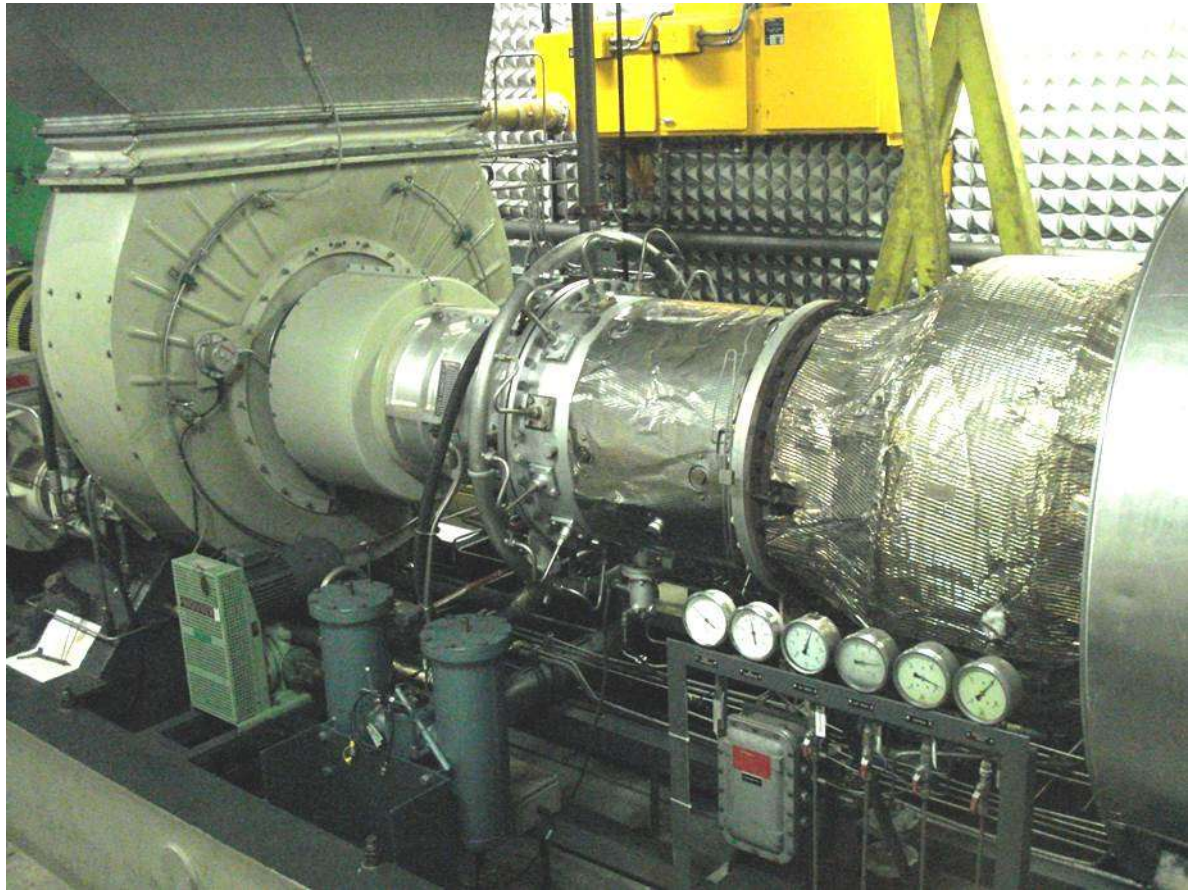


Combined Cycle CHP Station SYSTEM HUTTER Varel 1

Type:	Combined Cycle CHP Station SYSTEM HUTTER CH 45	
Project Scope:	New Combined Gas Turbine & Steam Turbine CHP Station with existing Steam Turbo Set	
Customer:	PAPER- AND CARDBOARD Mill VAREL; Varel, Germany	
Commissioning & Hand-over	1989	
Yearly Operation Hours	8600	h
Gas Turbine Model	Solar Centaur H	
Nominal Electr. Power Gas Turbo Set ISO	4.4	MW
Steam Turbine Type	Back-pressure	
Nominal Electr. Power Steam Turbo Set	5.6	MW
Nominal Total Electrical Capacity	10.0	MW
Nominal Live Steam Massflow	45	t/h
Nominal Live Steam Condition	64	bar
	450	°C
Process Steam Pressure	3.6	bar
Fuel	Natural gas / Bio gas	
Install. Firing Rate Boiler at combined cycle	2 x 19	MW
Fuel Utilisation Factor	93	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	75	ppm
CO	< 5	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	229.2	kg/MWh

Combined Cycle CHP Station SYSTEM HUTTER Buchmann 1

Type:	Combined Cycle CHP Station SYSTEM HUTTER Repowering CH 65	
Project Scope:	Retrofit existing heavy oil-fired HP-Steam Generator & Installation of Gas Turbine upstream Steam Generator	
Customer:	CARDBOARD MILL BUCHMANN; Annweiler-Sarnstall, Germany	
Commissioning & Hand-over	1992	
Yearly Operation Hours	8600	h
Gas Turbine Model	Solar Taurus T60	
Nominal Electr. Power Gas Turbo Set ISO	4.6	MW
Steam Turbine Type	Extraction-Condensing	
Nominal Electr. Power Steam Turbo Set	10.5	MW
Nominal Total Electrical Capacity	15.1	MW
Nominal Live Steam Massflow	65	t/h
Nominal Live Steam Condition	110	bar
	520	°C
Process Steam Pressure	9.0/3.6	bar
Fuel	Natural gas	
Install. Firing Rate Boiler at Combined Cycle	3 x 17	MW
Fuel Utilisation Factor	93	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	70	ppm
CO	< 5	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	230.4	kg/MWh



Combined Cycle CHP Station SYSTEM HUTTER Smurfit Kappa BKPO 1

Type:	Combined Cycle CHP Station SYSTEM HUTTER CH 50	
Project Scope:	New Combined Gas Turbine & Steam Turbine CHP Station with existing Steam Turbo Set	
Customer:	Cardboard Mill SMURFIT KAPPA BADISCHE KARTON; Obertsrot, Germany	
Commissioning & Hand-over	1994	
Yearly Operation Hours	8600	h
Gas Turbine Model	Solar Taurus T60	
Nominal Electr. Power Gas Turbo Set ISO	4.6	MW
Steam Turbine Type	Extraction-Condensing	
Nominal Electr. Power Steam Turbo Set	10.0	MW
Nominal Total Electrical Capacity	14.6	MW
Nominal Live Steam Massflow	50	t/h
Nominal Live Steam Condition	64	bar
	480	°C
Process Steam Pressure	3.8	bar
Fuel	Natural gas & Fuel Oil No. 2	
Install. Firing Rate Boiler at Combined Cycle	2 x 17	MW
Fuel Utilisation Factor	92.5	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	60	ppm
CO	< 5	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	229.2	kg/MWh

Combined Cycle CHP Station SYSTEM HUTTER Smurfit Kappa HOYA 1

Type:	Combined Cycle CHP Station SYSTEM HUTTER CH 45	
Project Scope:	Complete new Combined Gas Turbine & Steam Turbine CHP Station	
Customer:	Paper Mill SMURFIT KAPPA HOYA; Hoya, Germany	
Commissioning & Hand-over	1996	
Yearly Operation Hours	8600	h
Gas Turbine Model	Rolls Royce KB7	
Nominal Electr. Power Gas Turbo Set ISO	5.1	MW
Steam Turbine Type	Back-pressure	
Nominal Electr. Power Steam Turbo Set	4.5	MW
Nominal Total Electrical Capacity	9.6	MW
Nominal Live Steam Massflow	45	t/h
Nominal Live Steam Condition	64	bar
	450	°C
Process Steam Pressure	4.3	bar
Fuel	Natural gas	
Install. Firing Rate Boiler at Combined Cycle	2 x 16	MW
Fuel Utilisation Factor	92	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	50	ppm
CO	< 5	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	231.7	kg/MWh

Combined Cycle CHP Station SYSTEM HUTTER Varel 2

Type:	SYSTEM HUTTER CH 65	
Project Scope:	Complete new Combined Gas Turbine & Steam Turbine CHP Station	
Customer:	PAPER- AND CARDBOARD MILL VAREL; Varel, Germany	
Commissioning & Hand-over	2002	
Yearly Operation Hours	8600	h
Gas Turbine Model	Siemens SGT-300	
Nominal Electr. Power Gas Turbo Set ISO	7.9	MW
Steam Turbine Type	Back-pressure	
Nominal Electr. Power Steam Turbo Set	8.5	MW
Nominal Total Electrical Capacity	16.4	MW
Nominal Live Steam Massflow	65	t/h
Nominal Live Steam Condition	70	bar
	480	°C
Process Steam Pressure	6.0	bar
Fuel	Natural gas	
Install. Firing Rate Boiler at Combined Cycle	2 x 28	MW
Fuel Utilisation Factor	92.5	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	35	ppm
CO	< 5	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	229.2	kg/MWh

Combined Cycle CHP Station SYSTEM HUTTER Buchmann 2

Type:	Combined Cycle CHP Station SYSTEM HUTTER CH 30	
Project Scope:	New Combined Gas Turbine & Steam Turbine CHP Station with existing Steam Turbo Set	
Customer:	CARDBOARD MILL BUCHMANN; Annweiler-Sarnstall, Germany	
Commissioning & Hand-over	2007	
Yearly Operation Hours	8600	h
Gas Turbine Model	Rolls Royce KB5	
Nominal Electr. Power Gas Turbo Set ISO	3.5	MW
Steam Turbine Type	Extraction-Back-pressure	
Nominal Electr. Power Steam Turbo Set	3.7	MW
Nominal Total Electrical Capacity	7.2	MW
Nominal Live Steam Massflow	26	t/h
Nominal Live Steam Condition	45	bar
	450	°C
Process Steam Pressure	9.0/3.6	bar
Fuel	Natural gas	
Install. Firing Rate Boiler at Combined Cycle	1 x 15	MW
Fuel Utilisation Factor	90.2	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	45	ppm
CO	< 40	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	237.9	kg/MWh

Steam Turbine CHP Station, Stora Enso Uetersen 1

Type:	Repowering to Steam Turbine CHP Station with existing Steam Generators	
Project Scope:	Search & Evaluation of used Steam Turbines; Refurbishment & Modernisation of used Steam Turbine, Modernisation of Hydraulics, New Electrical, New Control, Instrumentation & Piping & Valves Project Mgmt, Engineering, Arrangement Plan., Erection Mgmt, Commission.	
Customer:	Paper Mill STORA ENSO UETERSEN, Uetersen, Germany	
Commissioning & Hand-over	2007	
Yearly Operation Hours	8600	h
Nominal Electr. Power Steam Turbo Set	7	MW
Nominal Live Steam Massflow	57	t/h
Nominal Live Steam Condition	42	bar
	460	°C
Process Steam Pressure	3.9	bar
Installed Firing Rate Boiler	2 x 22.5 MW (Fuel Gas)	
Fuel Utilisation Factor	91	%
Time-Reliability	> 99	%

Combined Cycle CHP Station SYSTEM HUTTER Varel 3

Type:	Combined Cycle CHP Station SYSTEM HUTTER CH 95 G	
Project Scope:	New Combined Gas Turbine & Steam Turbine CHP Station with existing Steam Turbo Set	
Customer:	PAPER- AND CARDBOARD MILL VAREL; Varel, Germany	
Commissioning & Hand-over	2008	
Yearly Operation Hours	8600	h
Gas Turbine Model	Solar Taurus T65	
Nominal Electr. Power Gas Turbo Set ISO	2 x 6.3	MW
Steam Turbine Type	Back-pressure	
Nominal Electr. Power Steam Turbo Set	13	MW
Nominal Total Electrical Capacity	25.6	MW
Nominal Live Steam Massflow	95	t/h
Nominal Live Steam Condition	65 - 90	bar
	460 - 480	°C
Process Steam Pressure	6.0	bar
Fuel	Natural gas	
Install. Firing Rate Boiler at Combined Cycle	2 x 28	MW
Fuel Utilisation Factor	92	%
Time-Reliability	> 99	%
Emissions (ref. to 3 Vol-% O_2 dry)		
NO_x	30	ppm
CO	< 5	ppm
CO_2 (ref. to useful Electr.- & Heating Energy)	231.7	kg/MWh

Waste Incineration CHP Plant Mainz Line 3

Type: Waste Incineration CHP Plant

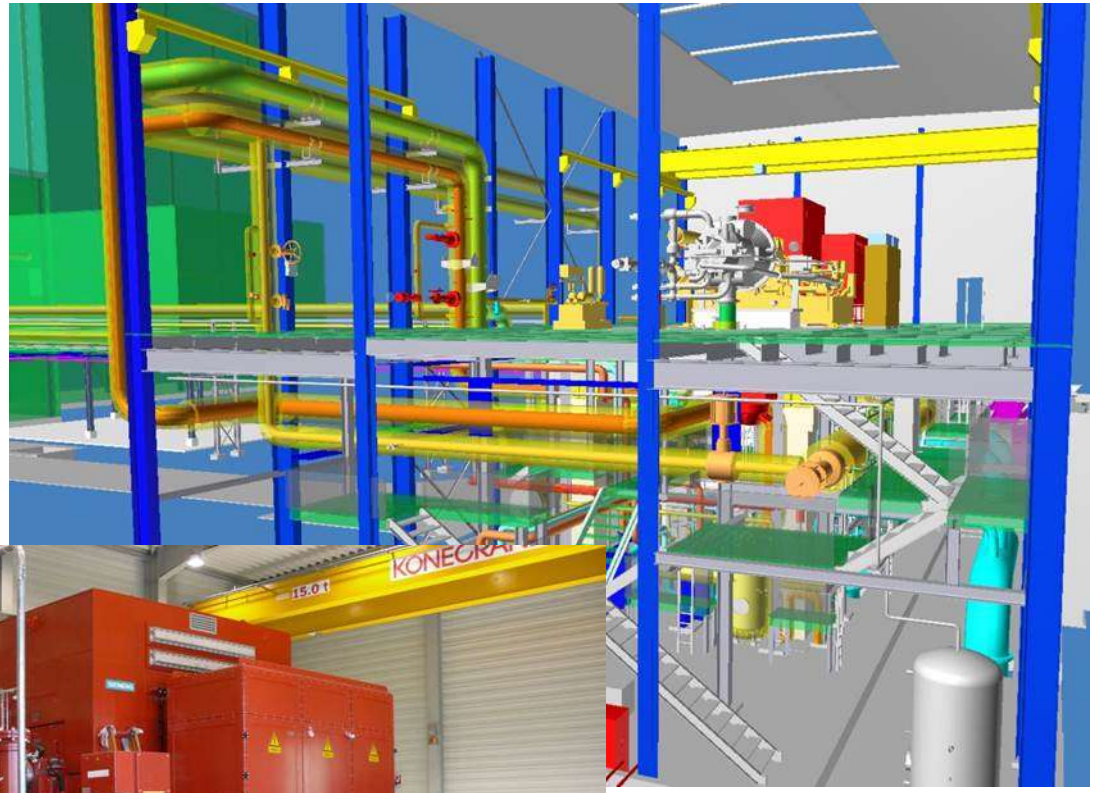
Project Scope for Energy Part: Overall concept, Engineering, Integration, Arrangement Plan., Erection, Commissioning;
Turn-key Delivery of Energy Part around Steam Turbo Set

For Waste Incineration Line 3: Quality Control of the entire mechanical erection, Overall Commissioning Mgmt

For Integration of all Plants at Site: System-Engineering for the energetic integration of the waste incineration, the gas turbine- & steam turbine power plant, the existing energy part, the new energy part with steam turbo set, the district heating extraction, and tie-in of the new steam consumption supply system.

Customer: ENTSORGUNGS-GESELLSCHAFT MAINZ, Mainz, Germany

Commissioning & Hand-over	2009	
Yearly Operation Hours	8200	h
Nominal Electr. Power Steam Turbo Set	20.7	MW
Extraction-Condensing-Turbine		
Nominal Live Steam Massflow to ST	90	t/h
Nominal Live Steam Condition	40	bar
	415	°C
Extraction Steam Pressure 1	3.4	bar
Extraction Steam Pressure 2	0.7 – 1.9	bar
Condensate Preheating	5.1	MW
Exhaust Steam directly cooled in condenser with river water		
Exhaust Steam Pressure	0.05	bar
Max. Cooling Water Massflow	5200	m3/h
Planned with 2-stage District Heating	25	MW
Time-Reliability	> 99	%



Combined Cycle CHP Station SYSTEM HUTTER UPM Nordland Papier 1

Type:	Combined Cycle CHP Station SYSTEM HUTTER 2 x CH 200	
Project Scope:	Design, Permitting & Pre-Engineering	
	for complete new Combined Gas Turbine & Steam Turbine CHP Station	
Customer:	Paper Mill UPM Nordland Papier GmbH, Dörpen, Germany	
Authority Permit received:	July 2011	
Planned Yearly Operation Hours	8600	h
Nominal Electr. Power Gas Turbo Set ISO	2 x 42	MW
Steam Turbine Type	Back-pressure	
Nominal Electr. Power Steam Turbo Set	70	MW
Nominal Total Electrical Capacity	154	MW
Nominal Live Steam Massflow	2 x 200	t/h
Nominal Live Steam Condition	92	bar
	505	°C
Process Steam Pressure	6	bar
Fuel	Natural Gas	
Installed Firing Rate at Combined Cycle	4 x 30	MW per Boiler
Fuel Utilisation Factor	> 90	%
CO_2 (ref. to useful Electr.- & Heating Energy)	238	kg/MWh

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